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Production of Peppers

DEPARTMENT OF AGRICULTURE

PRODUCTION OF PEPPERS

By J. H. Beattie, *senior horticulturist*, and S. P. Doolittle, *senior pathologist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry.* Revised by W. R. Beattie, *senior horticulturist*, and Roy Magruder, *olericulturist.*

History and Importance

Although peppers are apparently native to North America, their culture and use were widespread in Europe before they became popular in the United States. Within the last 30 years there has been a great increase in the production and consumption of fresh and canned peppers in the United States. According to data appearing in Agricultural Statistics, 1939, issued by the United States Department of Agriculture, 21,070 acres of peppers were grown in 1938 for marketing in the fresh state, and production amounted to 4,970,000 bushels. This was approximately 1,000,000 bushels above the average. Besides the crop grown for marketing in the fresh state, considerable quantities of the pimiento type of pepper are grown in the South Atlantic States and elsewhere for canning. As a rule, between 8, 000 and 10,000 acres are devoted to the growing of these canning peppers, the production averaging about 14,000 to 16,000 tons a year. Recently the markets for both the fresh and canned peppers have seemed to be fully supplied; it may therefore be assumed that there is no special justification for increasing the acreage or production of peppers.

For many years the pepper has been grown on a small scale in home gardens for use in mixed pickles, as a fresh vegetable mixed with other vegetables for salads, for flavoring meats, and in other ways. Hot peppers are prepared and marketed in such well-known forms as cayenne, tabasco pepper sauce, tabasco catchup, and chile powder, which is used in preparing chili con carne. Large quantities of paprika have been imported in the past, but attempts are now being made to grow the supply in this country. Fresh green peppers are commonly found in the vegetable markets, packed in crates, hampers, splint baskets, and ventilated barrels. The garden pepper (*Capsicum annuum*) is distinct from the black and white pepper of commerce, which is *Piper nigrum*. The latter is grown only in the Tropics and has an entirely different growth habit.

Description

The pepper is a perfect-flowered annual, the plant being usually 1 to 2½ feet tall, with smooth, glossy, somewhat elongated heart-shaped leaves. The flowers are usually dull white and are borne singly or in groups of two or three. The fruit is variable in size and shape; most varieties are green when immature and red when ripe. Others are yellow during their early stages but turn red at maturity.

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Climatic Adaptation

The climatic requirements of peppers are essentially the same as for the tomato and eggplant, although they are not so drought-resistant as the eggplant. They thrive best in warm climates and are frost tender. Experiments under controlled conditions have shown that maximum growth, earliest blooming, and first-ripe fruits are produced at daily average temperatures of about 75° F., with an abundance of soil fertility and moisture well distributed throughout the growing season. Temperatures lower than this result in slower growth, later blooming, and later fruit maturity. A light, warm soil gives best results, and since it is conducive to earliness it is especially desirable in regions where the growing season is limited by killing frosts.

The dropping of part of the blossoms is characteristic of all large-fruited varieties, as they produce many more flowers than the plants can develop to mature fruit. As soon as the plants have set all the fruit they can mature, the flowers formed later drop off, many of them before opening. Following the removal of the maturing fruit there is usually another set of fruit from flowers that open after the harvest. Under very unfavorable conditions half-grown fruits may drop off. All of the flowers formed during a period of high temperatures (90° F. or above), low humidity, and insufficient rainfall or irrigation may drop off, regardless of the quantity of fruit already on the plants. At temperatures above 95°, with a low humidity or strong wind, this will happen even though there is plenty of moisture in the soil, because the leaves lose water faster than the roots can supply it. Under such conditions the plants will remain unfruitful until temperatures are lower and moisture conditions have improved. The small-fruited varieties are more tolerant of high temperature and drought conditions than the large-fruited ones.

Varieties

Pepper varieties are of two general types with reference to the flavor of the flesh, the sweet or mild-flavored, and the hot or pungent-flavored.

The most popular market variety of sweet pepper is California Wonder, which has square or blocky, very thick-walled fruits but requires a long season for large yields and therefore is not so productive in the northern section of the country as Worldbeater. Worldbeater is extensively grown as a market variety and has large rectangular or slightly tapered, thick-walled fruits, is midseason in maturity, and very productive. King of the North is recommended as an early market variety for the Northern States and as a very dependable home-garden variety, with rectangular fruits large enough to stuff or for other culinary uses. Ruby King or Royal King is preferred for home gardens in the South because the tall plants hold the fruits off the ground. Perfection, or Pimiento, is the thick-walled, heart-shaped variety that produces the pimientos of commerce. It is late maturing and is not commercially practical north of the Gulf Coast and South Atlantic States. Sunnybrook is a short tomato-shaped variety that may be used in the same way as Pimiento in the northern section of the country. The fruit of all of the above-mentioned varieties are green when immature but become dark red when allowed to mature.

Oshkosh is probably the most productive and dependable of the mild-flavored varieties that have yellow color when mature.

The hot or pungent-fleshed varieties mentioned below all have red flesh when mature. Tabasco is the small, very hot variety used either green or red in making pepper or tabasco sauce. It is grown commercially only in the Gulf Coast States, as it requires too long a season for northern sections. Red Chili is a small, very hot finger pepper which grows erect on short plants that mature early enough for culture in northern sections and may be used in the same way as Tabasco, or dried for seasoning purposes. Long Red Cayenne and Long Thick Cayenne are slightly later, longer, curved, or twisted, and very hot varieties with taller plants. Anaheim Chili is a late-maturing variety, grown in the Southwestern States and California, from which the chili powder of commerce is made. Hungarian Wax is semihot, pale yellow when immature, early, very productive, and in demand on the larger markets, where it is sometimes called Banana pepper, because of its appearance.

The pungency common to hot varieties is principally in and around the seeds and can be removed in part, if desired, in preparing this type for the table. Hot peppers are popular in the warmer regions of the South and especially among people of Spanish or southwestern European descent, by whom they are used extensively as pickles, as a condiment, or in flavoring foods.

The Hungarian paprika pepper, from which the mild paprika is made, is of medium size, usually 1½ to 2 inches in diameter at the base, tapering to a blunt point, and about 4 inches long. It has deep-red color when mature, and any pungency that it may possess is found mainly in the seeds and the membrane to which they are attached.

Fertilization

The plant-food requirements of peppers are similar to those of tomatoes and eggplants. Fertile soils well supplied with humus are desirable. Large applications of highly nitrogenous fertilizers, while increasing vegetative growth, may also seriously delay maturity. In general, moderate applications of phosphoric acid alone or in a complete fertilizer, such as one analyzing 4 percent of nitrogen, 12 percent of phosphoric acid, and 4 percent of potash, will hasten maturity and increase the yield of fruit. A side dressing of some quickly available form of nitrogen at rates of from 100 to 200 pounds per acre may be used profitably on peppers, particularly those for early market.

Propagation and Planting

On account of their long growing season and their sensitiveness to frost, pepper plants are usually started either in a greenhouse or in hotbeds in the North. In the South early plants are usually grown in cloth-covered steam- or hot-water-heated frames. Plants for later use are grown either in frames or outdoors.

Pepper seed requires from 8 to 12 days to germinate; hence, plenty of time should be allowed in deciding the date of seeding. Pepper seed retains its viability about 4 years. About 8 to 10 weeks from seeding is required to develop plants suitable for setting in the field.

The seed is sown usually in flats in rows 2 inches apart or is broadcast and transplanted to pots or dirt bands or to other flats when the plants are about an inch high. If transplanted to flats, they should be spaced at least 2 inches apart. Pepper plants are often handled in cloth-covered beds, the seedlings being spaced about 5 inches apart in each direction; and at planting time a knife is run between the plants in each direction, cutting the soil into blocks about the roots. These blocks of soil are then lifted carefully by means of flat trowels, placed on trays, and carefully transported to the fields, where they are set in slight furrows. This method of growing the plants gives practically the same results as are obtained from pot-grown plants. Where the plants are set in the field before the weather has become thoroughly warm it may be necessary to resort to the use of plant protectors. Little, if anything, is gained by setting the plants until after the danger from cold or severe winds has passed. Spacing in the field varies with the variety, but ordinarily it is in rows 2½ to 3½ feet apart and 18 inches apart in the row. The same methods of setting are used as with tomatoes.

Cultivation

Peppers require frequent shallow cultivation in order to keep the soil loose and mellow to a depth of 2 or 3 inches and the crop entirely free of weeds. Riding cultivators, one-horse walking cultivators, and small tractor cultivators may be used. The first cultivation should be given shortly after the plants are set in the field or garden. Subsequent cultivations should follow at intervals of 1 week or 10 days and after a rain or irrigation as soon as the ground is sufficiently dry for working. Hand hoeing may be required to keep down weeds, especially during the early part of the season before the plants begin to shade the ground.

Irrigation

Wherever the natural rainfall is insufficient to maintain a fair and uniform degree of moisture in the soil some form of irrigation should be employed in order to keep the plants growing steadily. Overhead irrigation is used in a number of the eastern pepper-growing sections, and the furrow system is largely employed in the western sections. In setting the pepper plants, it is always desirable to apply a small amount of water around their roots, this to be followed by a regular irrigation, in the absence of rainfall, within a few hours after setting.

Diseases

Peppers are affected by a number of diseases that may prove serious under seasonal conditions favorable to their spread and development. The problem of disease control, however, is no greater than that for similar vegetable crops of the same class.

Bacterial spot is of general occurrence. It is evident on the foliage as small, circular, blisterlike spots of a yellowish-green color, and when serious it may cause defoliation. Similar blisterlike spots occur on the fruit and not only injure the appearance but afford entrance to soft-rot organisms. The disease is seed-borne and may be controlled by treating the seed for 2 minutes with corrosive sublimate diluted to

a strength of 1 to 1,000 or 1 tablet dissolved in a pint of water and by spraying with 3–6–50 bordeaux mixture to protect the plants in the field.

Anthracnose occurs quite generally, the ripe fruit being especially susceptible. It causes black water-soaked depressions on the fruit, these often being followed by soft rot. Control measures include the destruction of diseased fruits, crop rotation, spraying with bordeaux mixture, and seed disinfection.

Rhizoctonia causes a damping-off of the plants in the seedbed and is best controlled by keeping the surface soil loose and dry and by treating the seed with red oxide of copper or organic mercury dusts.

Fusarium wilt is most serious on chili peppers in the Southwest. It causes a wilting of the plants, beginning at the base of the stem. The wilt organism lives in the soil and is spread by wind, rain, and irrigation water. It is partially controlled by setting the plants on ridges or by carefully avoiding an excess of irrigation water.

Phytophthora blight is most serious in New Mexico, causing cankers on the stem, which produce wilting and death of the plant. The rot lesions on the fruit can be distinguished by the fact that they extend only the long way of the pod. The organism lives in both the soil and the seed. It is controlled by using seed from healthy fruits and by bordeaux spraying.

Cercospora leaf spot is common wherever peppers are grown and is worst in wet years. It causes a circular, water-soaked spotting of the leaves and may produce partial defoliation and occasionally a stem-end decay of the fruit. Spraying with bordeaux mixture and seed disinfection are recommended for its control.

Sclerotium rot produces a firm brown decay at the base of the stem, causing the plant to yellow and die. The organism lives in the soil and on old trash in the field. Clean cultivation and rotation are recommended for control.

Mosaic is of general occurrence and occasionally causes serious losses. It is a virus disease and produces a yellow mottling and malformation of the foliage, accompanied by a severe stunting of the plant. It is spread by aphids. Control measures include use of nicotine sulfate as a spray or dust to kill the aphids and clean cultivation of the land to remove the weeds, which act as wild hosts of the virus that is carried by the aphids.

Insect Pests

The potato flea beetle, the pepper weevil, the pepper maggot, the red spider, and plant lice are the commonest insect pests of the pepper plant. However, with the exception of the pepper weevil in the Southwest and California and the pepper maggot in New Jersey these insects cause only sporadic damage to the crop.

For information regarding the control of these insects apply to your county agent, to your State agricultural experiment station, or to the United States Department of Agriculture, Washington, D. C.

Farmers' Bulletin No. 1371 contains information on the diseases and insects of garden vegetables and can be secured by writing to the United States Department of Agriculture, Washington, D. C.

Harvesting and Marketing

Green peppers intended for marketing in the fresh state should be allowed to reach approximately full size but should be gathered at rather frequent intervals and before they begin to change color. After being gathered, they should not be exposed to the sun and wind but should be moved directly to the packing shed, packed, and then sent to market. Pimiento peppers used for canning should be allowed to develop a full red color before being picked. Chili and other hot peppers should not be gathered before they are ripe. After they are gathered they should be dried. Late in the season the plants should be pulled and hung up, so that the remaining peppers can ripen and become dry. Hungarian paprika peppers should remain on the plants until fully colored, and then be gathered and dried on screens or trays in special driers, after which they can be ground to paprika powder either with or without the seeds.

The Agricultural Marketing Service of the United States Department of Agriculture has formulated standards for sweet peppers, and this information would be of assistance to those growing peppers for market. A copy of these standards may be obtained by addressing a request to that Service.

Peppers are marketed in a variety of containers, but care must be taken to use those that conform to the legal requirements governing containers for interstate shipment. Information about this matter may also be obtained from the Agricultural Marketing Service.

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